

CLAIMS

What is claimed is:

- 1 1. A method for estimating channel parameters from a communications signal
2 containing interference, the method comprising the steps of:
3 receiving a communications signal;
4 generating a baseband signal from the communications signal;
5 processing the baseband signal;
6 selecting a maximum signal from the baseband signal;
7 suppressing the interference when the maximum signal is not stronger the
8 interference; and
9 generating an estimate of the channel parameters from the maximum signal when the
10 maximum signal is stronger than the interference.
- 1 2. The method as recited in claim 1 wherein the step of processing the baseband signal
2 further comprises the steps of:
3 descrambling the baseband signal;
4 correlating the descrambled baseband signal with a set of spreading sequences; and
5 performing maximum ratio combination correlations on the descrambled baseband
6 signal and the set of spreading sequences.

1 3. The method as recited in claim 1 wherein the maximum signal comprises a common
2 pilot channel.

1 4. The method as recited in claim 1 wherein the maximum signal comprises interfering
2 signal components.

1 5. The method as recited in claim 1 wherein the step of suppressing the interference
2 further comprises the steps of:

3 detecting one or more interference sequences;

4 generating a symbol estimate for each of the one or more interference sequences;

5 spreading the symbol estimate for each of the one or more interference sequences;

6 summing the spread symbol estimate for each of the one or more interference

7 sequences to generate a composite signal;

8 scrambling the composite signal;

9 applying a channel estimate to generate an estimate of an interfering signal

10 component of the composite signal; and

11 generating a new version of the baseband signal from a previous version of the

12 baseband signal and the estimate of an interfering signal component of the composite signal.

1 6. The method as recited in claim 1 further comprising the step of repeating the steps of
2 processing the baseband signal, selecting the maximum signal from the baseband signal and
3 suppressing the interference until the maximum signal is stronger than the interference.

1 7. A method for estimating channel parameters from a communications signal
2 containing interference, the method comprising the steps of:
3 receiving a communications signal;
4 generating a baseband signal from the communications signal;
5 processing the baseband signal to produce a first signal and a second signal;
6 estimating a first channel parameter from the first signal and a second channel
7 parameter from the second signal;
8 suppressing the interference using a weighted average of the first channel parameter
9 and the second channel parameter;
10 repeating the steps of estimating the first and second channel parameters and
11 suppressing the interference when the first signal is not stronger the interference; and
12 generating an estimate of the channel parameters from the first signal when the first
13 signal is stronger than the interference.

1 8. The method as recited in claim 7 wherein the step of processing the baseband signal
2 further comprises the steps of:
3 descrambling the baseband signal; and
4 correlating the descrambled baseband signal with a set of spreading sequences.

1 9. The method as recited in claim 7 wherein the step of suppressing the interference
2 further comprises the steps of:

3 generating an estimate of the channel parameters using a weighted average of the first
4 channel parameter and the second channel parameter;

5 performing maximum ratio combination correlations on the processed baseband
6 signal and the set of spreading sequences; and

7 selecting a new first signal using the maximum ratio combination correlations.

1 10. The method as recited in claim 7 wherein the first signal comprises a common pilot
2 channel.

1 11. The method as recited in claim 7 wherein the second signal comprises interfering
2 signal components.

1 12. The method as recited in claim 7 wherein the step of repeating the steps of estimating
2 the first and second channel parameters and suppressing the interference when the first signal
3 is not stronger the interference further comprises the step of selecting the second signal from
4 a maximum signal of the processed baseband signal.

- 1 13. An apparatus for estimating channel parameters from a communications signal
2 comprising:
- 3 an interference canceler coupled to a channel emulator;
4 a descrambler coupled to the interference canceler;
5 a correlator coupled to the descrambler
6 a channel estimator coupled to the correlator;
7 a maximal ratio combiner coupled to the correlator and the channel estimator;
8 a symbol estimator and interferer sequence detector coupled to the maximal ratio
9 combiner;
- 10 a signal spreader coupled to the symbol estimator and interferer sequence detector;
11 a scrambler coupled to the signal spreader; and
12 the channel emulator coupled to the scrambler and the channel estimator.

- 1 14. A communications device comprising:
- 2 an antenna;
- 3 a receiver coupled to the antenna;
- 4 a transmitter coupled to the antenna;
- 5 a controller coupled to the receiver and the antenna;
- 6 a display coupled to the controller;
- 7 a speaker coupled to the controller;
- 8 a memory coupled to the controller;
- 9 a microphone coupled to the controller;
- 10 a keypad coupled to the controller;
- 11 the receiver comprising a radio frequency to baseband converter coupled to the
- 12 antenna, a channel parameter estimator coupled to the baseband converter and the controller;
- 13 and
- 14 the channel parameter estimator comprising an interference canceler coupled to a
- 15 channel emulator and the radio frequency to baseband converter, a descrambler coupled to
- 16 the interference canceler, a correlator coupled to the descrambler, a channel estimator
- 17 coupled to the correlator, a maximal ratio combiner coupled to the correlator, the channel
- 18 estimator and the controller, a symbol estimator and interferer sequence detector coupled to
- 19 the maximal ratio combiner, a signal spreader coupled to the symbol estimator and interferer
- 20 sequence detector, a scrambler coupled to the signal spreader, and the channel emulator
- 21 coupled to the scrambler and the channel estimator.

- 1 15. An apparatus for estimating channel parameters from a communications signal
2 comprising:
3 a descrambler;
4 a correlator coupled to the descrambler
5 a first channel estimator coupled to the correlator;
6 a second channel estimator coupled to the correlator;
7 a channel averaging device coupled to the first channel estimator and the second
8 channel estimator;
9 a maximal ratio combiner coupled to the correlator and the channel averaging device;
10 and
11 a symbol estimator and interferer sequence detector coupled to the maximal ratio
12 combiner, the first channel estimator and the second channel estimator.

1 16. A communications device comprising:
2 an antenna;
3 a receiver coupled to the antenna;
4 a transmitter coupled to the antenna;
5 a controller coupled to the receiver and the antenna;
6 a display coupled to the controller;
7 a speaker coupled to the controller;
8 a memory coupled to the controller;
9 a microphone coupled to the controller;
10 a keypad coupled to the controller;
11 the receiver comprising a radio frequency to baseband converter coupled to the
12 antenna, a channel parameter estimator coupled to the baseband converter and the controller;
13 and
14 the channel parameter estimator comprising a descrambler to the radio frequency to
15 baseband converter, a correlator coupled to the descrambler, a first channel estimator coupled
16 to the correlator, a second channel estimator coupled to the correlator, a channel averaging
17 device coupled to the first channel estimator and the second channel estimator, a maximal
18 ratio combiner coupled to the correlator and the channel averaging device, and a symbol
19 estimator and interferer sequence detector coupled to the controller, the maximal ratio
20 combiner, the first channel estimator and the second channel estimator.

1 17. A computer program embodied on a computer readable medium for estimating
2 channel parameters from a communications signal containing interference, the computer
3 program comprising:

- 4 a code segment for receiving a communications signal;
- 5 a code segment for generating a baseband signal from the communications signal;
- 6 a code segment for processing the baseband signal;
- 7 a code segment for selecting a maximum signal from the baseband signal;
- 8 a code segment for suppressing the interference when the maximum signal is not
9 stronger the interference; and
- 10 a code segment for generating an estimate of the channel parameters from the
11 maximum signal when the maximum signal is stronger than the interference.

1 18. The computer program as recited in claim 17 wherein the code segment for
2 processing the baseband signal further comprises:

- 3 a code segment for descrambling the baseband signal;
- 4 a code segment for correlating the descrambled baseband signal with a set of
5 spreading sequences; and
- 6 a code segment for performing maximum ratio combination correlations on the
7 descrambled baseband signal and the set of spreading sequences.

1 19. The computer program as recited in claim 17 wherein the maximum signal comprises
2 a common pilot channel.

1 20. The computer program as recited in claim 17 wherein the maximum signal comprises
2 interfering signal components.

1 21. The computer program as recited in claim 17 wherein the code segment for
2 suppressing the interference further comprises the steps of:

3 a code segment for detecting one or more interference sequences;

4 a code segment for generating a symbol estimate for each of the one or more
5 interference sequences;

6 a code segment for spreading the symbol estimate for each of the one or more
7 interference sequences;

8 a code segment for summing the spread symbol estimate for each of the one or more
9 interference sequences to generate a composite signal;

10 a code segment for scrambling the composite signal;

11 a code segment for applying a channel estimate to generate an estimate of an
12 interfering signal component of the composite signal; and

13 a code segment for generating a new version of the baseband signal from a previous
14 version of the baseband signal and the estimate of an interfering signal component of the
15 composite signal.

- 1 22. The computer program as recited in claim 17 further comprising a code segment for
2 repeatedly processing the baseband signal, selecting the maximum signal from the baseband
3 signal and suppressing the interference until the maximum signal is stronger than the
4 interference.

1 23. A computer program embodied on a computer readable medium for estimating
2 channel parameters from a communications signal containing interference, the computer
3 program comprising:
4 a code segment for receiving a communications signal;
5 a code segment for generating a baseband signal from the communications signal;
6 a code segment for processing the baseband signal to produce a first signal and a
7 second signal;
8 a code segment for estimating a first channel parameter from the first signal and a
9 second channel parameter from the second signal;
10 a code segment for suppressing the interference using a weighted average of the first
11 channel parameter and the second channel parameter;
12 a code segment for repeating the steps of estimating the first and second channel
13 parameters and suppressing the interference when the first signal is not stronger the
14 interference; and
15 a code segment for generating an estimate of the channel parameters from the first
16 signal when the first signal is stronger than the interference.

1 24. The computer program as recited in claim 23 wherein the code segment for
2 processing the baseband signal further comprises:

3 a code segment for descrambling the baseband signal; and

4 a code segment for correlating the descrambled baseband signal with a set of
5 spreading sequences.

1 25. The computer program as recited in claim 23 wherein the code segment for
2 suppressing the interference further comprises:

3 a code segment for generating an estimate of the channel parameters using a weighted
4 average of the first channel parameter and the second channel parameter;

5 a code segment for performing maximum ratio combination correlations on the
6 processed baseband signal and the set of spreading sequences; and

7 a code segment for selecting a new first signal using the maximum ratio combination
8 correlations.

1 26. The computer program as recited in claim 23 wherein the first signal comprises a
2 common pilot channel.

1 27. The computer program as recited in claim 23 wherein the second signal comprises
2 interfering signal components.

1 28. The computer program as recited in claim 23 wherein the code segment for
2 repeatedly estimating the first and second channel parameters and suppressing the
3 interference when the first signal is not stronger the interference further comprises a code
4 segment for selecting the second signal from a maximum signal of the processed baseband
5 signal.

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